

Claims

What is claimed is:

5 1. A chemically amplified resist composition, said composition comprising:
a) an imaging polymer,
b) acid-labile moieties,
c) a radiation-sensitive acid generator, and
d) a base additive component, wherein said base additive component
10 comprises:
(i) a room temperature solid base, and
(ii) a liquid low vapor pressure base.

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15 2. The composition of claim 1 wherein said low vapor pressure base has a vapor pressure of about 2 mm at room temperature.

20 3. The composition of claim 1 wherein said low vapor pressure base has a vapor pressure of about 1 mm at room temperature.

25 4. The composition of claim 1 wherein said solid base is selected from the group consisting of aromatic amines and imidazoles.

5. The composition of claim 1 wherein said low vapor pressure base is selected from the group consisting of triethanolamine, 1-naphthylamine, 2-naphthylamine, diphenylamine, acetanilide, 3,6,9-triazaundecamethylenediamine, 4,4'-propane-1,3-diylbismorpholine, and 1,8-azabicycloundecene.

30 6. The composition of claim 1 wherein said acid-labile moieties are pendant from said imaging polymer.

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7. The composition of claim 1 wherein said acid-labile moieties are selected from the group consisting of acetal moieties and ketal moieties.

8. A method of forming a patterned material structure on a substrate, said
5 method comprising:

- (A) providing a substrate with a layer of said material,
- (B) applying a resist composition to said substrate to form a resist layer on said substrate, said resist composition comprising
 - a) an imaging polymer,
 - b) acid-labile moieties,
 - c) a radiation-sensitive acid generator, and
 - d) a base additive component, wherein said base additive component comprises:
 - (i) a room temperature solid base, and
 - (ii) a liquid low vapor pressure base,
- (C) patternwise exposing said substrate to radiation whereby acid is generated by radiation-sensitive acid generator in exposed regions of said resist layer,
- (D) developing a patterned resist structure in said resist layer by
20 removing radiation-exposed portions of said resist, and
- (E) transferring resist structure pattern to said material layer by removing portions of said material layer through spaces in said resist structure pattern.

25 9. The method of claim 8 wherein said material is selected from the group consisting of organic dielectrics, metals, ceramics, and semiconductors.

10. The method of claim 8 wherein said acid-labile protecting group is a moiety selected from the group consisting of ketals, acetals and orthoesters.

11. The method of claim 8 wherein said transfer of step (F) comprises reactive ion etching.

5 12. The method of claim 8 wherein at least one intermediate layer is provided between said material layer and said resist layer, and step (E) comprises etching through said intermediate layer.

11² 11. The method of claim 8 wherein said resist is thermally treated between 10 steps (C) and (D).

12³ 12. The method of claim 8 wherein said radiation used in step (C) has a wavelength selected from the group consisting of 248 nm, 193 nm, 157 nm, 13.4 nm, 1.4 nm, and 1.1 nm.

15 13⁴ 13. The method of claim 8 where said radiation used in step (C) is selected from the group consisting of with electron beam and ion beam.

14⁵ 14. The method of claim 8 wherein said material layer is comprises a 20 chromium-containing composition, SiON or TiN.

15⁶ 15. The method of claim 14 wherein said material layer is comprises a chromium-containing composition.

25 16⁷ 16. A method of forming a material structure on a substrate, the method comprising:
(A) providing a substrate,
(B) applying a resist composition to the substrate to form a resist layer on the substrate, said resist composition comprising

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- a) an imaging polymer,
- b) acid-labile moieties,
- c) a radiation-sensitive acid generator, and
- d) a base additive component, wherein said base additive component comprises:
 - (i) a room temperature solid base, and
 - (ii) a liquid low vapor pressure base,

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- (C) patternwise exposing the substrate to radiation whereby acid is generated by radiation-sensitive acid generator in exposed regions of the resist layer,
- (D) developing a patterned resist structure in the resist layer by removing radiation-exposed portions of the resist, and
- (E) transferring resist structure pattern to the material by depositing the material onto the substrate or implanting material into the substrate at spaces in the resist structure pattern.

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17. The method of claim 16 wherein said deposition of step (E) is done by electroplating, chemical vapor deposition or physical vapor deposition.